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Wenderoth Lind & Ponack LLP
2033 K Street NW
Suite 800
Washington, DC 20006

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PEREZ, GUILLERMO

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 20

Application Number: 09/520,149
Filing Date: March 07, 2000
Appellant(s): MURAKAMI ET AL.

W. Douglas Hahm
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed August 21, 2002.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

Appellant's brief includes a statement that claims 49-94 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

EP 0642210 A1	Takahashi et al.	3-1995
US 1761836 A	McFarlane et al.	6-1930
JP 406245418 A	Asai	9-1994
JP 405304737 A	Tanimoto et al.	11-1993

US 5191256 A Reiter, Jr. et al. 3-1993

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 49-66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted Prior Art (APA) in view of Takahashi (EP 0642210 A1).

APA discloses a permanent magnet synchronous motor (21) having a stator (22) with a concentrated winding (23) such that adjacent teeth (22) have different polarities. APA discloses a permanent magnet (25) in the rotor (24) comprising a ferrite magnet. APA discloses that the stator (22) comprises a divided core (22) and that the motor (21) is driven in a sensor-less operation.

However, APA does not disclose that the relations of $0.3\ Lg < La < 2.0\ Lg$, and $2\ Lg < Lb < 5\ Lg$ are established, where

La is a clearance between teeth of the stator;

Lb is a depth of a tooth edge; and

Lg is an air-gap between the stator and a rotor. APA does not disclose that the motor drives a compressor used in one of an air-conditioner and an electric refrigerator. APA does not disclose that the rotor and stator are arranged such that Lg is not greater that 0.6 mm.

Takahashi discloses that a relation of $0.3\ Lg < La < 2.0\ Lg$ is established, where

La is a clearance between teeth of the stator; and

Lg is an air-gap between the stator and a rotor (column 13, lines 16-38). Takahashi discloses that the motor (figure 1) drives a compressor used in one of an air-

conditioner and an electric refrigerator (column 1, lines 15-18). Takahashi discloses that the rotor (2) and stator (1) are arranged such that Lg is not greater that 0.6 mm (column 13, lines 34-38). Takahashi's invention have the purpose of facilitating manufacturing of the electric motor.

It would have been obvious at the time the invention was made to modify the permanent magnet synchronous motor of APA and provide it with the relation and the application disclosed by Takahashi for the purpose of facilitating manufacturing of the electric motor and avoiding the demagnetization of the permanent magnets.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a relation between a depth of a tooth edge and the air-gap between the stator and a rotor since it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller,* 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claims 67-71 are rejected under 35 U.S.C. 103(a) as being unpatentable over APA in view of J. C. Macfarlane et al. (U. S. Pat. 1,761,836).

APA discloses a permanent magnet synchronous motor (21) having a stator (22) with concentrated windings (23) such that adjacent teeth (22) have different polarities. APA discloses that a permanent magnet (25) in the rotor (24) comprises a ferrite magnet. APA discloses that the stator (22) comprises a divided core. APA discloses that the motor (21) is driven in a sensor-less operation.

However, APA does not disclose that at least one of the leading-side edge and the trailing-side edge having a bevel formed at a first end closest to the rotor and having a protrusion formed at a second end farthest from the rotor such that each side edge of each tooth is maintained at a substantially constant depth.

J. C. Macfarlane et al. disclose that at least one of the leading-side edge and the trailing-side edge (L^t) have a bevel formed at a first end closest to the rotor (r) and have a protrusion formed at a second end farthest from the rotor (r) such that each side edge (T^t, L^t) of each tooth (p^t) is maintained at a substantially constant depth. The invention of J. C. Macfarlane et al. has the purpose of producing a higher magnetic reluctance path and desirably affecting the volt-ampere curve or the commutating properties of the machine.

It would have been obvious at the time the invention was made to modify the permanent magnet synchronous motor of APA and provide it with the stator of J. C. Macfarlane et al. for the purpose of producing a higher magnetic reluctance path and desirably affecting the volt-ampere curve or the commutating properties of the machine.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use an electric motor to drive a compressor since it was known in the art that compressors for A/C or refrigerators are operated with electric motors.

Claims 72-77, and 81-83 are rejected under 35 U.S.C. 103(a) as being unpatentable over APA in view of Asai (JP 406245418A).

APA discloses a permanent magnet synchronous motor (21) having a stator (22) with a concentrated winding (23) such that adjacent teeth (22) have different polarities. APA discloses that the motor (21) is driven in a sensor-less operation.

However, APA does not disclose an inwardly-tapered section being formed at each side of the outer wall with respect to the radial direction of the rotor so as to form a recessed section at each side of the permanent magnet. APA does not disclose that a relation of (.10)As < Am < (.25)As is established,

where "Am" is an angle of an arc length of the tapered section at each side of the outer wall of the permanent magnet measured with respect to a central axis of the rotor; and

"As" is an angle of an arc length of each tooth measured with respect to the central axis of the rotor. APA does not disclose that the permanent magnet is mounted on an outer wall of a rotor core, and a recessed section is formed at an open space from where both the end sections of the permanent magnet are cut away in the rim direction. APA does not disclose that the motor is used to drive the compressor of a A/C or refrigerator.

Asai discloses an inwardly-tapered section (62a) being formed at each side of the outer wall with respect to the radial direction of the rotor (61) so as to form a recessed section at each side of the permanent magnet (62). Asai discloses that the permanent magnet (62) is mounted on an outer wall of a rotor core (61), and a recessed section (62a) is formed at an open space from where both the end sections of the

permanent magnet (62) are cut away in the rim direction. Asai's invention have the purpose of preventing an increase in gap loss.

It would have been obvious at the time the invention was made to modify the permanent magnet synchronous motor of APA and provide it with the permanent magnets and recessed sections of Asai for the purpose of preventing an increase in gap loss.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to establish a relation between an opening angle of a recessed section and an opening angle of teeth of the stator since it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller,* 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use an electric motor to drive a compressor since it was known in the art that compressors for A/C or refrigerators are operated with electric motors.

Claims 78-80, 84-89 are rejected under 35 U.S.C. 103(a) as being unpatentable over APA in view of Asai as applied to claim 7 above, and further in view of Tanimoto (JP 405304737).

APA and Asai disclose a permanent magnet synchronous motor (21) as described on item 3 above.

However, neither APA nor Asai disclose that an inner wall of the permanent magnet facing a radial direction is flat face for increasing a depth of a center section of

the permanent magnet in the rim direction. Neither APA nor Asai disclose that the permanent magnet is buried in a rotor core along a rotor-core rim, and a cut-away section is formed at a section corresponding to both the end sections of the permanent magnet in the rim direction. Neither APA nor Asai disclose that the permanent magnet is buried in a rotor core along a rotor-core rim, and a slit is formed at a section corresponding to both the end sections of the permanent magnet in the rim direction. Neither APA nor Asai disclose that the rotor further includes a spacer in the recessed section formed at each side of the permanent magnet.

Tanimoto discloses in figure 8 that an inner wall of the permanent magnet (36) facing a radial direction is flat face for increasing a depth of a center section of the permanent magnet (36) in the rim direction. Tanimoto discloses in figure 7 that the permanent magnet (26) is buried in a rotor core (22') along a rotor-core rim, and a cut-away section (a) is formed at a section corresponding to both the end sections of the permanent magnet (26) in the rim direction. Tanimoto discloses that the permanent magnet (26) is buried in a rotor core (22') along a rotor-core rim, and a slit (a) is formed at a section corresponding to both the end sections of the permanent magnet (26) in the rim direction. Tanimoto discloses that the rotor further includes a spacer (a) in the recessed section (26) formed at each side of the permanent magnet (figure 7). Tanimoto's invention have the purpose of reducing unnecessary cogging torque.

It would have been obvious at the time the invention was made to modify the permanent magnet synchronous motor of APA and Asai and provide it with the

permanent magnets and slits as described by Tanimoto for the purpose of reducing unnecessary cogging torque.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use an electric motor to drive a compressor since it was known in the art that compressors for A/C or refrigerators are operated with electric motors.

Claims 90-94 rejected under 35 U.S.C. 103(a) as being unpatentable over APA in view of Reiter, Jr. et al. (U. S. Pat. 5,191,256).

APA discloses a permanent magnet synchronous motor (21) having a stator (22) with a concentrated winding (23) such that adjacent teeth (22) have different polarities. APA discloses that the motor is driven in a sensor-less operation.

However, APA does not disclose that the rotor including a curved permanent magnet and a rotor core having a core rim, the permanent magnet being buried in the rotor core along the core rim such that a center of curvature of the permanent magnet is outside the rotor and such that a side end of the permanent magnet faces the rotor rim from inside the rotor rim, the rotor further including a spacer formed in the rotor at the side end of the permanent magnet. APA does not disclose that a relation of $Lg < Q < 3\,Lg$ is established,

where Q is a distance between the end of the permanent magnet and the rotor-core rim; and

Lg is an air-gap between the stator and the rotor. APA does not disclose that a relation of $(.10)As < Am < (.25)As$ is established,

where "Am" is an angle of an arc length of the spacer at the side end of the permanent magnet measured with respect to a central axis of the rotor; and

"As" is an angle of an arc length of each tooth measured with respect to the central axis of the rotor.

Reiter, Jr. et al. disclose that the rotor (40) including a curved permanent magnet (17) and a rotor core (40) having a core rim, the permanent magnet (17) being buried in the rotor core (40) along the core rim such that a center of curvature of the permanent magnet (17) is outside the rotor (40) and such that a side end of the permanent magnet (17) faces the rotor rim from inside the rotor rim, the rotor (40) further including a spacer (95) formed in the rotor (40) at the side end of the permanent magnet (17). The invention of Reiter, Jr. et al. have the purpose of minimizing flux leakage, hysteresis loss, eddy current loss, and heat production.

It would have been obvious at the time the invention was made to modify the permanent magnet synchronous motor of APA and provide it with the permanent magnets as disclosed by Reiter, Jr. et al. for the purpose of minimizing flux leakage, hysteresis loss, eddy current loss, and heat production.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to establish a relation between the distance from the end of the permanent magnet to the rotor-core rim “Q” and the air-gap between the stator and the rotor. Also it would have been obvious to establish a relation between the opening angle “Am” of the permanent magnet and the opening angle “As” of the teeth of the stator since it has been held that where the general conditions of a claim are disclosed in the

prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller,* 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use an electric motor to drive a compressor since it was known in the art that compressors for A/C or refrigerators are operated with electric motors.

(11) Response to Argument

Claims 49-54 are not patentable over the prior art.

Applicants' arguments are directed to point out that neither the Applicants' admitted Prior Art (APA) nor Takahashi disclose that the rotor and the stator are arranged to meet the range $0.3Lg<La\leq 2.0Lg$, where:

La is the clearance between adjacent teeth of the stator; and

Lg is the air gap between the rotor and the stator. Takahashi discloses that the clearance "s" (*which corresponds to the character "La" of the application*) between adjacent teeth of the stator measures 1.08 mm (*column 8, lines 42-44 and column 13, lines 16-20*). Takahashi also discloses that the air gap "g" between the rotor and the stator (*which corresponds to the character "Lg" of the application*) measures 2.01 mm (*column 13, lines 25-29*). When these values are inserted in the claimed range $0.3Lg<La\leq 2.0Lg$, the following values are obtained:

$0.3 * 2.01mm < 1.08mm \leq 2.0 * 2.01mm =$

$0.603\ mm < 1.08mm \leq 4.02mm.$

The Applicants' claimed range as disclosed in the claims is satisfied by the values disclosed in Takahashi.

Applicants' arguments are also directed to point out that Takahashi discloses a motor with "distributed windings" rather than "concentrated windings". However, Takahashi does not mention what type of windings are being used in the disclosed embodiments. The Applicants defined the term "concentrated windings" on page 1, lines 21-23 of the application, but the Applicants did not defined the term "distributed windings". It is not possible to differentiate what type of windings "1c" are shown in Takahashi without a definition of the term "distributed windings". Moreover, Takahashi does not mention a specific type of stator windings in the disclosure. The only reference to windings being done in Takahashi is in Figures 1, 5, and 8, where the stator "1" is being shown with unspecified windings "1c".

A person with ordinary skill in the art could not specifically point out what type of winding is being used in Figures 1, 5, and 8 of Takahashi, and yet, the Applicants argue that these are specifically "distributed windings". The Applicants' admitted Prior Art discloses that "distributed windings" as well as "concentrated windings" are well known in the art, but no specific definition was provided to the term "distributed windings".

Takahashi is providing the specified stator and air gap measurements in order to minimize the demagnetization effect of the rotor permanent magnets. This effect occurs due to high speed rotation and the influence of the stator slots on the frequency of magnet flux density. The magnetic flux density becomes high and induces eddy current flows within the rotor, which increases heat in the rotor and reduces the magnetic force of the permanent magnets (column 7, lines 33-44). The permanent magnets demagnetization occurs in dynamoelectric machines having stator winding slots facing

rotor surfaces as shown in the APA and Takahashi references. Minimizing demagnetization on permanent magnet rotors is highly desirable and needed in the type of machines being disclosed by APA and Takahashi, as can be read on pages 2-3 of APA and column 7, lines 33-44 of Takahashi. A person of ordinary skill in the art would be motivated to look into Takahashi to correct the problems presented in APA.

The Examiner therefore believes that APA in view of Takahashi teach the claimed limitations and that the arguments presented by the applicant are not considered to rebut the prima facie case of obviousness. Claims 49-54 are still considered to be unpatentable.

Claims 55-60 are not patentable over the prior art.

Regarding the argument that the Examiner asserted that Takahashi discloses the range $2.0Lg<Lb\leq5.0Lg$, it must be noted that the Examiner did not assert that. The Examiner asserted that it "*would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a relation between a depth of a tooth edge and the air-gap between the stator and a rotor since it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).*"

As can be seen in APA and Takahashi, minimizing demagnetization on permanent magnet rotors is highly desirable and needed in dynamoelectric machines. APA and Takahashi are addressing these problems by adjusting the variables for the size of the stator slots clearance and the air gap. APA and Takahashi are relying on

routine experimentation to optimize the operation of the machines. The Applicants as well are relying on routine experimentation to optimize the operation of the claimed embodiment. APA and Takahashi disclose all the claimed structural limitations except for the range $2.0Lg<Lb\leq5.0Lg$. However, it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Applicants' arguments are also directed to point out that Takahashi discloses a motor with "distributed windings" rather than "concentrated windings". However, Takahashi does not mention what type of windings are being used in the disclosed embodiments. The Applicants defined the term "concentrated windings" on page 1, lines 21-23 of the application, but the Applicants did not defined the term "distributed windings". It is not possible to differentiate what type of windings "1c" are shown in Takahashi without a definition of the term "distributed windings". Moreover, Takahashi does not mention a specific type of stator windings in the disclosure. The only reference to windings being done in Takahashi is in Figures 1, 5, and 8, where the stator "1" is being shown with unspecified windings "1c".

A person with ordinary skill in the art could not specifically point out what type of winding is being used in Figures 1, 5, and 8 of Takahashi, and yet, the Applicants argue that these are specifically "distributed windings". The Applicants' admitted Prior Art discloses that "distributed windings" as well as "concentrated windings" are well known in the art, but no specific definition was provided to the term "distributed windings".

Takahashi is providing the specified stator and air gap measurements in order to minimize the demagnetization effect of the rotor permanent magnets. This effect occurs due to high speed rotation and the influence of the stator slots on the frequency of magnet flux density. The magnetic flux density becomes high and induces eddy current flows within the rotor, which increases heat in the rotor and reduces the magnetic force of the permanent magnets (*column 7, lines 33-44*). The permanent magnets demagnetization occurs in dynamoelectric machines having stator winding slots facing rotor surfaces as shown in the APA and Takahashi references. Minimizing demagnetization on permanent magnet rotors is highly desirable and needed in the type of machines being disclosed by APA and Takahashi, as can be read on pages 2-3 of APA and column 7, lines 33-44 of Takahashi. A person of ordinary skill in the art would be motivated to look into Takahashi to correct the problems presented in APA.

The Examiner therefore believes that APA in view of Takahashi teach the claimed limitations and that the arguments presented by the applicant are not considered to rebut the prima facie case of obviousness. Claims 55-60 are still considered to be unpatentable.

Claims 61-66 are not patentable over the prior art.

Regarding the argument that the Examiner's asserts that Takahashi discloses the range $2.0Lg<Lb\leq5.0Lg$, it must be noted that the Examiner did not assert that. The Examiner asserted that it "*would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a relation between a depth of a tooth edge and the air-gap between the stator and a rotor since it has been held that where*

the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)."

As can be seen in APA and Takahashi, minimizing demagnetization on permanent magnet rotors is highly desirable and needed in dynamoelectric machines. APA and Takahashi are addressing these problems by adjusting the variables for the size of the stator slots clearance and the air gap structures. APA and Takahashi are relying on routing experimentation to optimize the operation of the machines. The Applicants as well are relying on routine experimentation to optimize the operation of the claimed embodiment. APA and Takahashi disclose all the claimed structural limitations except for the range $2.0Lg<Lb\leq5.0Lg$. However, it has been held that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Takahashi also discloses that the air gap "g" between the rotor and the stator (*which corresponds to the character "Lg" of the application*) measures 2.01 mm (*column 13, lines 25-29*). When these values are inserted in the claimed range $0.3Lg<La\leq2.0Lg$, the following values are obtained:

$0.3 * 2.01mm < 1.08mm \leq 2.0 * 2.01mm =$

$0.603\ mm < 1.08mm \leq 4.02mm.$

The Applicants' claimed range as disclosed in the claims is satisfied by the values disclosed in Takahashi.

Applicants' arguments are also directed to point out that Takahashi discloses a motor with "distributed windings" rather than "concentrated windings". However, Takahashi does not mention what type of windings are being used in the disclosed embodiments. The Applicants defined the term "concentrated windings" on page 1, lines 21-23 of the application, but the Applicants did not defined the term "distributed windings". It is not possible to differentiate what type of windings "1c" are shown in Takahashi without a definition of the term "distributed windings". Moreover, Takahashi does not mention a specific type of stator windings in the disclosure. The only reference to windings being done in Takahashi is in Figures 1, 5, and 8, where the stator "1" is being shown with unspecified windings "1c".

A person with ordinary skill in the art could not specifically point out what type of winding is being used in Figures 1, 5, and 8 of Takahashi, and yet, the Applicants argue that these are specifically "distributed windings". The Applicants' admitted Prior Art discloses that "distributed windings" as well as "concentrated windings" are well known in the art, but no specific definition was provided to the term "distributed windings".

Takahashi is providing the specified stator and air gap measurements in order to minimize the demagnetization effect of the rotor permanent magnets. This effect occurs due to high speed rotation and the influence of the stator slots on the frequency of magnet flux density. The magnetic flux density becomes high and induces eddy current flows within the rotor, which increases heat in the rotor and reduces the magnetic force of the permanent magnets (*column 7, lines 33-44*). The permanent magnets demagnetization occurs in dynamoelectric machines having stator winding slots facing

rotor surfaces as shown in the APA and Takahashi references. Minimizing demagnetization on permanent magnet rotors is highly desirable and needed in the type of machines being disclosed by APA and Takahashi, as can be read on pages 2-3 of APA and column 7, lines 33-44 of Takahashi. A person of ordinary skill in the art would be motivated to look into Takahashi to correct the problems presented in APA.

The Examiner therefore believes that APA in view of Takahashi teach the claimed limitations and that the arguments presented by the applicant are not considered to rebut the prima facie case of obviousness. Claims 61-66 are still considered to be unpatentable.

Claims 67-71 are not patentable over the prior art.

With regards to Applicant's argument that MacFarlane does not disclose or suggest a bevel formed at a first end of the edge closest to the rotor, nor a protrusion formed at the second end of the side farthest from the rotor, it must be noted that MacFarlane discloses all these limitations. MacFarlane discloses in figures 2-5 a bevel (*under either "L^t" or "T^t"*) formed at a first end of the edge closest to the rotor, and a protrusion (*above either "L^t" or "T^t"*) formed at the second end of the side farthest from the rotor. Also, refer to the figure 5 of the application.

Regarding Applicants' argument that MacFarlane relates to a dynamo and a magnetic winding of a DC machine, rather than to a motor having a stator with concentrated windings, it must be noted that the dynamo and magnetic winding of MacFarlane is a motor (*page 3, lines 51-58*) and that the concentrated windings are disclosed in APA.

Regarding the Applicant's argument that MacFarlane is not concerned with reducing demagnetization of permanent magnets in a rotor, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). MacFarlane discloses that their invention is desirable to affect the volt-ampere curve or the commutating properties of the machine. Both characteristics are essential to properly control the operation of the machine. The dynamos of APA and MacFarlane require the proper control of the volt-ampere curve or the commutation to avoid machine failure, overheating, and facilitate start up. A person of ordinary skill in the art would look into MacFarlane to provide proper control of the volt-ampere curve or the commutation to the machine disclosed in APA.

The Examiner therefore believes that APA in view of MacFarlane teach the claimed limitations and that the arguments presented by the applicant are not considered to rebut the prima facie case of obviousness. Claims 67-71 are still considered to be unpatentable.

Claims 72-89 are not patentable over the prior art.

Regarding to Applicants' arguments that Asai discloses a motor with "distributed windings" rather than "concentrated windings", it must be noted that Asai does not mention what type of windings are being used in the disclosed embodiments. The Applicants defined the term "concentrated windings" on page 1, lines 21-23 of the application, but the Applicants did not defined the term "distributed windings". It is not

possible to differentiate what type of windings "5" are shown in Asai without a definition of the term "distributed windings". The only reference to windings being done in Asai is in Figure 1, where the stator "4" is being shown with unspecified windings "5".

A person with ordinary skill in the art could not specifically point out what type of winding is being used in Figure 1 of Asai, and yet, the Applicants argue that these are specifically "distributed windings". The Applicants' admitted Prior Art discloses that "distributed windings" as well as "concentrated windings" are well known in the art, but no specific definition was provided to the term "distributed windings".

The Applicants argue that Tanimoto does not disclose or suggest the arrangement of the rotor as recited in independent claim 72. However, Tanimoto was not applied in the rejection of claim 72.

Asai is providing the specified rotor shape in order to prevent an increase in gap loss. An increase in gap loss occurs in dynamoelectric machines having stator winding slots facing rotor surfaces as those shown in the APA and Asai references. Minimizing gap loss in rotors is highly desirable and needed in the type of machines being disclosed by APA and Asai, as can be read on pages 2-3 of APA and the abstract of Asai. A person of ordinary skill in the art would be motivated to look into Asai to correct the losses presented in APA.

The Examiner therefore believes that APA in view of Asai and further of Tanimoto teach the claimed limitations and that the arguments presented by the applicant are not considered to rebut the prima facie case of obviousness. Claims 72-89 are still considered to be unpatentable.

Claims 90-94 are not patentable over the prior art.

Applicants' arguments are also directed to point out that Reiter discloses a motor with "distributed windings" rather than "concentrated windings". However, Reiter does not mention what type of windings are being used in the disclosed embodiments. The Applicants defined the term "concentrated windings" on page 1, lines 21-23 of the application, but the Applicants did not defined the term "distributed windings". It is not possible to differentiate what type of windings are shown in Reiter without a definition of the term "distributed windings". Moreover, Reiter does not mention a specific type of stator windings in the disclosure. The only reference to windings being done in Reiter is in Figure 5, where the stator "60" is being shown with unspecified windings (*in broken lines*).

A person with ordinary skill in the art could not specifically point out what type of winding is being used in Figure 5 of Reiter, and yet, the Applicants argue that these are specifically "distributed windings". The Applicants' admitted Prior Art discloses that "distributed windings" as well as "concentrated windings" are well known in the art, but no specific definition was provided to the term "distributed windings".

Reiter is providing the specified permanent magnet configuration in order to minimize the demagnetization effect of the rotor permanent magnets. This effect occurs due to high speed rotation and the influence of the stator slots on the frequency of magnet flux density. The magnetic flux density becomes high and induces eddy current flows within the rotor, which increases heat in the rotor and reduces the magnetic force of the permanent magnets (*column 6, lines 21-24*). The permanent magnets

demagnetization occurs in dynamoelectric machines having stator winding slots facing rotor surfaces as shown in the APA and Reiter references. Minimizing demagnetization on permanent magnet rotors is highly desirable and needed in the type of machines being disclosed by APA and Reiter, as can be read on pages 2-3 of APA and column 6, lines 21-24 of Reiter. A person of ordinary skill in the art would be motivated to look into Reiter to correct the problems presented in APA.

The Examiner therefore believes that APA in view of Reiter teach the claimed limitations and that the arguments presented by the applicant are not considered to rebut the prima facie case of obviousness. Claims 90-94 are still considered to be unpatentable.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Guillermo Perez
November 13, 2002

Conferees

Nestor Ramirez

Olik Chaudhuri OC

THOMAS M. DOUGHERTY
PRIMARY EXAMINER
GROUP 2834

WENDEROTH LIND & PONACK LLP
2033 K STREET NW
SUITE 800
WASHINGTON, DC 20006